

Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 36.

November, 1934.

No. 431.

MONOGRAPHIC STUDIES IN ELEOCHARIS. III.¹

H. K. SVENSON

Plates 320 and 321

1. THE EASTERN AMERICAN SEGREGATE OF ELEOCHARIS PAUCIFLORA

ELEOCHARIS PAUCIFLORA (Lightf.) Link from eastern America has a slender appearance compared with specimens from Europe. The fact was apparent to me in my previous treatment² of the species, but it seemed best to withhold further subdivision until material could be studied more closely. Shortly after a visit to the highlands of Scotland,³ Professor Fernald wrote me describing the different appearance of *Eleocharis pauciflora* in its type region (Scotland) as compared with the plant from eastern United States to Newfoundland, calling my attention especially to differences in size of the spikelet and the size and shape of the achene. These differences I find in general are well sustained.

Even within identical geographic areas the achenes are greatly variable in mass, prominence of reticulation, degree of acuteness of the outer angle (plano-convex or even biconvex achenes will occasionally be encountered) and the clear-cut or obscure character of the tubercle. Being an attractive species, *E. pauciflora* is often collected in the flowering stage, and due also to the small number and variability of the achenes, tabulation of data is often both difficult and unsatisfactory. Material from the Himalayas and Andes is especially

¹ Brooklyn Botanic Garden Contributions, No. 68.

² RHODORA xxxi. 171 (1929).

³ M. L. Fernald, Some Rare Plants of Scotland. Journ. Bot. lxi. 8-10. (1931).

meagre. Whatever success I may have in portraying the variation of *E. pauciflora* and related species is due largely to the photographs made by Mr. Louis Buhle and the painstaking drawings by Miss Maud H. Purdy, both of the Brooklyn Botanic Garden. Professor Fernald has been kind enough to send me for comparison a large collection of *Eleocharis pauciflora* from the Gray Herbarium, and I have borrowed much additional material through the courtesy of the curators of herbaria of the United States National Museum, the New York Botanical Garden, the California Academy of Sciences, the University of Wisconsin, and the New York State Museum; and through the kindness of the curators of the Herbarium of the Royal Botanic Gardens at Kew I have examined the rich collection of *Eleocharis* and the unfinished manuscript left by the late C. B. Clarke. Mr. J. William Thompson of Washington has also sent me excellent material from his herbarium.

As previously stated, one of the characteristic differences between the European and Eastern American plant is the size of achenes. Since it is difficult to accurately measure individual achenes to the tenth of a millimeter, a more satisfactory result is obtained by taking the total dimensions of four achenes placed end to end and side by side on a millimeter rule. Division of the total by four gives a good average size of individual achenes, as shown in the following table:

	EUROPE	
<i>F. Schultz</i> 1156	Germany	2.6 x 1.2 mm.
<i>Fernald</i> 2329	Scotland	2.5 x 1.3 mm.
<i>Bordère</i>	Hautes-Pyrénées	2.3 x 1.1 mm.
<i>Rasmussen</i>	Denmark	2.5 x 1.3 mm.
<i>Kneucker</i> 139	Switzerland	2.3 x 1.1 mm.
<i>P. de la Bathie</i>	France	2.6 x 1.2 mm.
	WESTERN NORTH AMERICA	
<i>Patterson</i>	Colorado	2.0 x 1.2 mm.
<i>Mackenzie</i> 186	Colorado	2.3 x 1.2 mm.
<i>Nelson</i> 6159	Wyoming	2.3 x 1.2 mm.
<i>Rydberg</i> 3811	Idaho	2.3 x 1.1 mm.
<i>Macoun</i>	Saskatchewan	2.0 x 1.1 mm.
<i>Munz</i> 10683	California	2.3 x 1.2 mm.
<i>Peck</i> 15438	Oregon	2.4 x 1.1 mm.
	SOUTH AMERICA	
<i>Werdermann</i> 1297	Chile	2.3 x 1.1 mm.
<i>Johnston</i> 4711	Chile	2.3 x 1.3 mm.
	EASTERN NORTH AMERICA	
<i>Gray Exsic.</i> 3	Maine	2.5 x 1.1 mm.
<i>Fernald</i> 12822	Maine	2.5 x 1.0 mm.

EASTERN NORTH AMERICA—*Continued*

<i>Fernald</i> 246	Maine ¹	1.9 x 0.9 mm.
<i>Macoun</i> 34565	Ontario	2.5 x 1.1 mm.
<i>Deam</i> 36640A	Indiana	2.5 x 1.1 mm.
<i>Vasey</i>	Illinois	2.4 x 1.0 mm.

ASIA

<i>Griffith</i>	Afghanistan	2.2 x 1.2 mm.
-----------------	-------------	---------------

VAR. SUKSDORFIANA

<i>Suksdorf</i> 2237	Washington	2.8 x 1.4 mm.
<i>Suksdorf</i> 2820	Washington	2.8 x 1.1 mm.
<i>A. S. Hitchcock</i>	Arizona	2.6 x 1.3 mm.

VAR. BERNARDINA

<i>Munz</i> 10804	California	2.1 x 1.2 mm.
<i>Hall</i> 7608	California	2.0 x 1.1 mm.

Professor Fernald's collection (wet peaty slope at Kinlochewe, Rosshire, Scotland, *Fernald, Pease & Long* 2329) is robust, more so than any other European material which I have seen, with rigid culms 20–25 cm. high and spikelets 6–8 mm. long,² and with approximately six flowers in a spikelet (see PL. 321, FIG. 1). In conformity with practically all European specimens the hardened caudices contrast with the generally soft material from eastern America in which (at least in herbarium specimens) the weak rootstocks appear scarcely thicker than the culms. Notably in some specimens from western Newfoundland (*Fernald, Long & Fogg* no. 1338 from "peaty and marly borders of shallow ponds in limestone barrens, Pointe Riche" and *Fernald, Wiegand & Long* no. 27524 from the Straits of Belle Isle) and occasionally in other collections from the northern limit of the range the caudices are hardened, in this respect approaching the plants of Europe and western United States. I have seen *E. pauciflora* only as scattered individuals in wet concentrated marl, but according to Professor Fernald's observations, a sort of turf is often formed. This turf apparently does not become as dense as in *Scirpus cespitosus* with which *Scirpus pauciflorus* was confused in early times, a condition which is of some significance in the discussion of *Eleocharis Vierhapperi* to follow. Withering³ at an early date observed that "The *S. pauciflorus* is very different in its habit from the *caespitosus*, for besides its growing single and not *caespitose*, the

¹ Dwarf plants 6–9 cm. high.

² Hegi, Ill. Fl. Mittel-Eur. ii. 40 (1909), describes the spikelets of *E. pauciflora* as 4–8 mm. long, and 3–7 flowered.

³ Arrangement of British Plants, ed. 6, ii. 112 (1818).

stems generally decline and scatter from each other, instead of being upright and close together."

The plant of Europe has in general a more prosperous appearance than the eastern American plant. The spikelets have a fuller aspect, and the achenes themselves are larger and more sharply angled. These characteristics together with the glistening surface and the strong regular development of bristle-teeth appear to be constant. The comparison may be summed up in tabular form:

E. PAUCIFLORA of Europe.	E. PAUCIFLORA of Eastern America.
Plants rigid, the caudices indurated.	Plants soft, with scarcely indurated caudices.
Spikelets 5-8 mm. long, averaging 6 flowers.	Spikelets a little narrower, 4-6 mm. long, averaging 5 flowers.
Achene equilaterally triangular, usually shiny.	Achene with abaxial angle usually somewhat broader, the achene usually dull and narrower than in the European plant.
Bristles with regular sharp retrorse teeth.	Teeth of bristles usually weak and irregular.

There is too much variation in surface markings and color of achenes for these characteristics to be of diagnostic value; the reticulation often varies greatly in different parts of the same achene, as may be seen in Miss Purdy's drawings. The surface is sometimes smooth, at other times with a depression in the central portion of each minute polygon. Longitudinal ribbing frequently occurs.

ELEOCHARIS PAUCIFLORA var. **Fernaldii**, n. var. PL. 320, FIG. 2; PL. 321, FIGS. 2, 5; also *RHODORA* xxxi. PL. 189, FIG. 23 (1929). A planta europaea recedit caudice non rigido, achaeniis angustioribus et minus angulatis, setarum barbibus pusillis.—Western Ontario to Newfoundland, south to Iowa, Illinois, Indiana, northwestern Pennsylvania, central New York, and northern New England. The TYPE, *Fernald & Long* 12822 (in Gray Herb.) is from a marly bog, Monticello, Maine. Geographically interesting stations in addition to records in my previous paper are QUEBEC: Brushy Island, east coast of James Bay, *D. Potter* 791 (G); Mingan, *H. F. Lewis*, Canadian Field Nat. xlv. 201 (1931); Wolf Bay (50° 16' N, 60° 18' W) and Bradore Bay (51° 28' N, 57° 14' W) *H. F. Lewis* in 1927 (Albany); Oka, *Victorin* 738 (G). VERMONT: Lyndon, *Congdon* in 1873 (B). ONTARIO: Manitoulin Island, Lake Huron, *Fassett* in *RHODORA* xxxv. 388 (1933). INDIANA: Hammond, Lake County, *Deam* 53939 (B). MICHIGAN: Cheboygan County, *F. C. Gates* nos. 9417, 9465, 9818 (B). IOWA: Estherville, *B. O. Walden* in 1931 (G).¹

¹To these records should be added: MAINE: Labrador Pond, East Sumner, *Gager & Svenson*, no. 6338. ONTARIO: Great Cloche Island, Manitoulin Distr., *Fernald & Pease*, no. 3146. MICHIGAN: Manistique, *Fernald & Pease*, no. 3147.

Dr. H. D. House of the New York State Museum at Albany has written me that *Eleocharis pauciflora* is not known in New York State east of Litchfield, Herkimer County, and that reports from the Adirondack region are probably based on specimens of *Scirpus cespitosus*.

The problem in western North America¹ is more difficult. The plants have thickened caudices and the achenes are closer in size (see table) and prominence of angles to those in Europe. The bristles, however, are more slender, resembling those of eastern American plants. Some of the western specimens are identical in appearance with the European, for example, *Nelson* 6159 from Yellowstone Park compared with *Petrak* 722, Fl. Bohemiae et Moraviae Exsic. I am inclined to believe that there is a series of intergrading variations between the gigantic var. *Suksdorfiana*, with its center of distribution apparently in the mountains of Washington and Oregon, to the depauperate material from southern California described as *Scirpus bernardinus*.² Of these two extremes the var. *Suksdorfiana*, at first confused with *Eleocharis rostellata*, is the more striking, with large spikelets often 1 cm. long and achenes approaching 3 mm. in length. Additions to collections of var. *Suksdorfiana* previously cited by me are WASHINGTON: near Egbert Spring, Douglas County, *Sandberg & Leiberg* 416 (B), culms reaching 35 cm. in height. OREGON: Mt. Hood, *Applegate* 2842 (U.S), with rigid culms 25–30 cm. high, similar to the type collection. COLORADO: Cassells, Park County, *Cathcart* in 1904 (U.S.), in flowering stage, culms broad, 30 cm. high, anthers 2–3 mm. long. ARIZONA: Flagstaff, *A. S. Hitchcock* in 1916 (U.S.). The last named collection has culms 5 dm. high and the largest subterranean buds measure approximately 1 x 0.5 cm. These buds or tubers appear to contain large quantities of starchy material, and in addition to being of value as food for aquatic birds (see RHODORA xxxi. 174 (1929), footnote), it is possible that selected stocks might produce a crop worth growing in boggy mountain meadows. The great economic value in the Orient of the “water chestnut” (*Eleocharis dulcis*) may be mentioned in this connection.

There is not yet sufficient understanding of *Eleocharis atacamensis* Philippi of the desert regions of Chile. This species Clarke reduced,

¹ The northernmost material seen is from NORTHWEST TERRITORIES: shore of Keith Island, Great Slave Lake, *Raup* 374 (G).

² On the basis of material examined, I think *Scirpus bernardinus* should be considered merely as an aberrant form of *Eleocharis pauciflora*. Its status as a variety is questionable.

with sufficient reason it seems to me, to the widespread and variable *Eleocharis pauciflora*. Barros¹ treats *E. atacamensis* as distinct, pointing out that in contrast to North American specimens of *E. pauciflora*, the 3-5 bristles are fewer, shorter than the achenes, thicker, and of a cinnamon color instead of white, and that the culms are arched. He also notes that the basal scale is sterile, whereas the plant of North America has the lowest scale fertile. Especially important is the heavy reticulation of the base of the style in undeveloped achenes (see fig. 31, l. c.) which Barros (and I am in perfect agreement with him) considers to be a distinctive characteristic of the genus *Eleocharis* as distinguished from *Scirpus*. This heavy reticulation is present to some extent in all species of the series *Pauciflorae* (cf. PL. 320), even in mature achenes. His figures of *Eleocharis atacamensis* leave no doubt in my mind that he is dealing with the same species that I have before me (represented by Johnston 4711 and Werdermann 1297). Philippi's description (quoted by Barros) calls for caespitose plants 3-3½ inches (8-9 cm.) tall and similar dwarf plants are figured by Barros. The abundant collection by Johnston contains dwarf spreading plants only 6 cm. high, (cf. PL. 320 FIG. 9) and tall erect ones reaching 25 cm., with many intermediates. Werdermann's plants (no. 1297) are 25-30 cm. tall; a representative of his no. 966 at Kew (Atacama, Chile 3600 m.) has a much thickened base and culms 22 cm. tall. In comparing these plants with specimens from North America and Europe, I am in agreement with Barros that the lowest scale is sterile (cf. *E. Vierhapperi*), a rare situation in *E. pauciflora*. The bristles are occasionally six. Their size does not differ appreciably from European material, but they do tend to be a trifle more reddish than in the general run of specimens. The style-base (tubercle) is generally less prominent and darker than in the North American and European specimens, but a whitened proximal area is sometimes well developed.² All things considered, this *Eleo-*

¹ Anales Mus. Hist. Nat. Buenos Aires xxxiv. 486-488, fig. 31 (1928).

² The style-base (tubercle) of *E. pauciflora* (cf. PL. 320) is made up of two parts. The lower is an upright column frequently of more spongy texture than the body of the achene. It is also usually differentiated by three grooves which form roughly an equilateral triangle in a plane at right angles to the long axis of the achene. The upper part consists of a dark fragment of the style itself. In the Andean material of *E. pauciflora* the spongy lower part of the tubercle is often reduced, sometimes nearly obliterated, and tends in general to be darker than in European specimens. A collection recently received from Argentina: Prov. Jujuy, 2500 m. Venturi 9650 (U. S., B), shows no difference from typical *E. pauciflora* except a darkening of the spongy lower portion of the tubercle and slightly darker bristles.

The upper portion of the tubercle is probably homologous with the entire tubercle

charis is so close to *E. pauciflora* that it may well be included within that species.

E. melanomphala C. B. Clarke, Engl. Bot. Jahrb. xxx. Beibl. 68: 24 (1901) was based upon a Chilean collection, *O. Kuntze* no. 30, Paso Cruz, 34° S, alt. 2100 m. The type specimen which I examined at Kew differs from *E. pauciflora* only in the plumper and smoother achene (2 mm. long), with its shorter tubercle. Reticulation characteristic of *E. pauciflora* is found on the achene, especially near the base.

The recently described *E. Vierhapperi* Bojko¹ from the South Tyrol Dolomites is said to differ from *E. pauciflora* in dwarfness (culms only 3–6 cm. high), in scattered (not cespitose) growth, in a thicker style which is not deciduous and which has 2 (occasionally 3) branches, in having 4 (or less) bristles, and the lowest scale of the spikelet *sterile* (in 27 out of 42 spikelets examined). The plants grew in strongly alkaline soil which had a concentration of 45% CaO and pH 7.8. Since lenticular achenes are occasionally found in *E. pauciflora*² it is therefore not surprising, though of great interest, to find a collection with transition from three to two style-branches. Persistence of the entire style in mature achenes of typical *E. pauciflora* is not uncommon. Both *E. pauciflora* and *E. Vierhapperi* are well illustrated and compared by Bojko, but I feel that *E. Vierhapperi* is a depauperate form of *E. pauciflora*, lying well within the limits of that species. The stolons as illustrated do not appear different from those of some other European collections, for example Flora Rhaetica Exsic. no. 414.

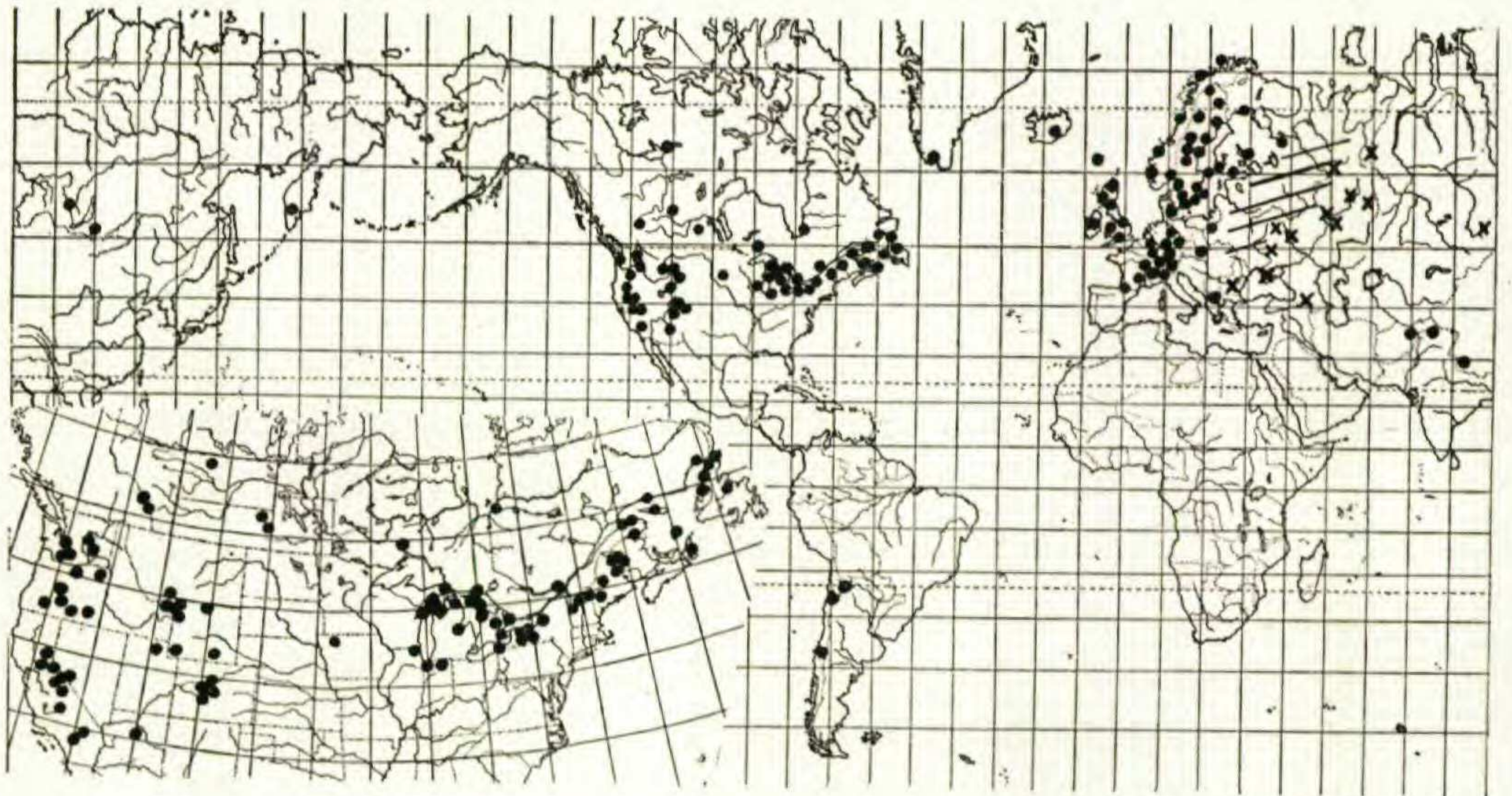
I have seen specimens of *E. pauciflora* from eastern Europe and Asia only as follows: GREECE: Pindus Tymphaeus, 4500–5000 ft., serpentine, *Haussknecht* in 1885 (Kew). AFGHANISTAN: *Griffith* (N. Y.). KASHMIR: Gurais Valley, *Winterbottom* 551 (Kew); Rangdum, 13000 ft., w. of Lara, Peti Valley, *Ormaston* 265 (Kew). TIBET occ.: 15000–16000 ft., *Thomson* (Kew, G). The eastern, often indefinite, localities mentioned by Hultén (Fl. Kamt. i. 169 (1927)) I have represented by crosses in the accompanying map (MAP 1). He gives the range of *E. pauciflora* as Iceland, northern Scandinavia,

in such specialized types of *Eleocharis* as *E. palustris*. The situation in *E. pauciflora*, i. e. a spongy column tipped by a fragment of the style, is analogous to structures in several species of the *Mutatae*, notably *E. cellulosa*, *E. mutata* and *E. plicarhachis*.

¹ Verh. Zool.-Bot. Ges. Wien lxxix. 300, 10 figs. (1930).

² I have noticed them very sparingly in *Fl. Hungarica Exsic.* no. 177 (some of the styles appear bifid) and *Munz* no. 10804 (California).

Vologda and Urals (62° N. lat.) south to central France, Italy, Bulgaria, Crimea, Poltava and Kursk; also in Spain. Scattered localities occur in other parts of Russia and in Transcaucasia. ASIA: some few localities in Tomsk prov., Irkutsk prov., Transbaikalia, and Kamtchatka, also in N. E. Asia Minor [perhaps represented by



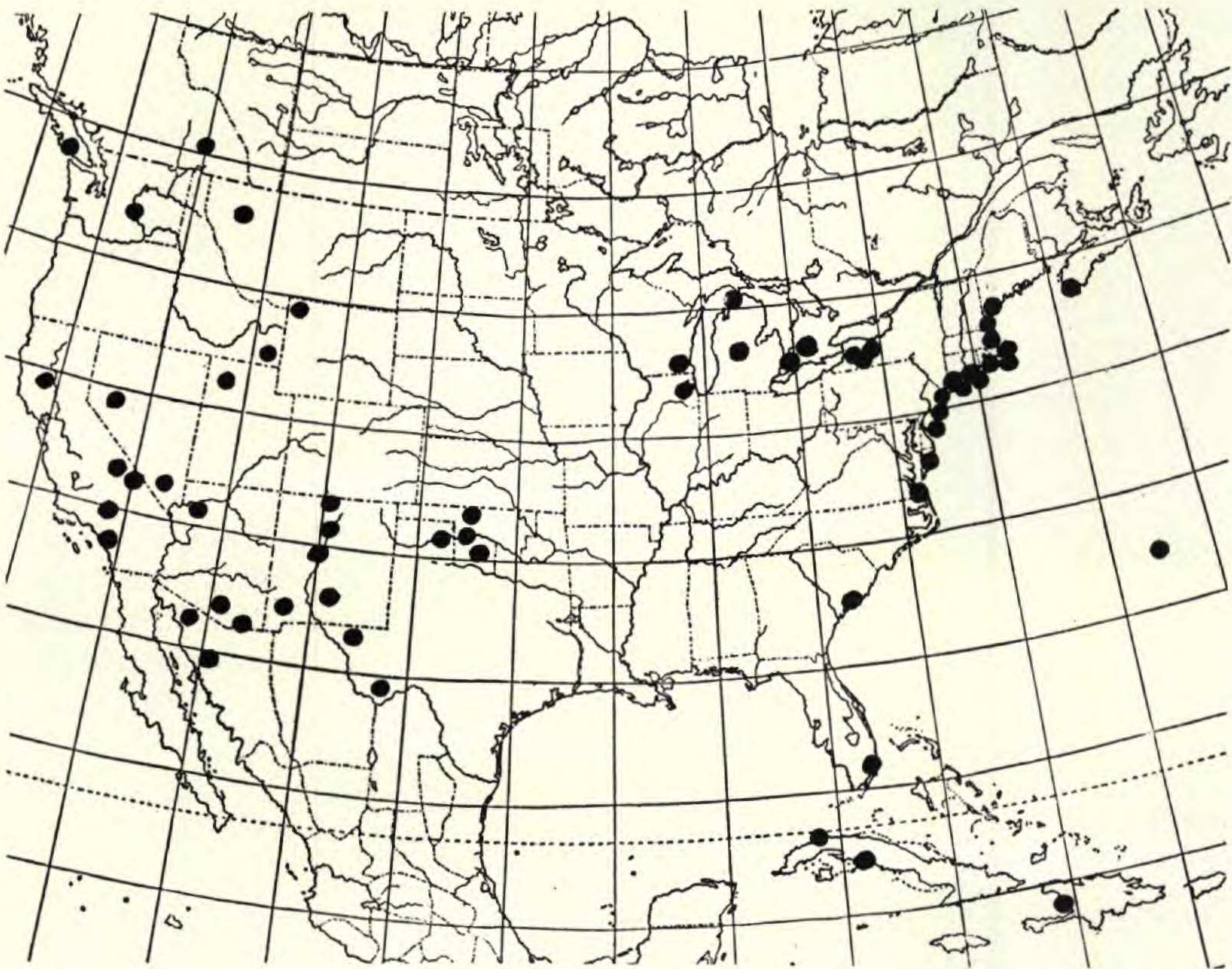
Map 1. Range of *ELEOCHARIS PAUCIFLORA*; insert, North American Range.

E. macrantha], and (?) Kashmir, Pamir and Tibet. Fedtchenko (Rastitel nost Turkestana 161 (1915)) cites it from the Sungarian Altai, Tian Shan, and Pamir. The stations on the map from Scandinavia, Finland and Western Russia are largely compiled from Blomgren in Holmberg, Skand. Fl. 311 (1926). The plant is common in Norway north to Magerø ($71^{\circ} 7' N$) according to Blytt, Norges Fl. ed Dahl, 175 (1906).¹

In a collection of *Eleocharis* from the U. S. National Herbarium, I was surprised to find good specimens of the closely related *E. rostellata* represented by *Venturi* nos. 6193 and 6194 from prov. Tucuman, Argentina, at altitudes of 2650 m. and 1650 m. respectively. These are the first records from South America. *E. platypus* C. B. Clarke, Engl. Bot. Jahrb. xxxiv, Beibl. 78. 3 (1904) is *E. rostellata*. The Spruce collection at Kew labeled "Andes Quitenses prope Guano

¹ In response to my inquiry as to the status of *E. pauciflora* in Greenland, Dr. Morten P. Porsild has written that, although the species is common in Iceland, it is one of the rarest plants in Greenland and is known at present from only four stations: Neria, $61^{\circ} 33'$, *J. Eugenius*; Igaliko, $61^{\circ} 2'$, *Rosenvinge*; Qagssiarssuk, $60^{\circ} 53'$, *A. E. & M. P. Porsild*; Unartoq, $60^{\circ} 30'$, *N. Hartz*.

1859" is the basis of Clarke's description. It consists of a plant with thickened rootstocks, long recurving culms, and achenes 2 mm. long, identical with those of *E. rostellata*. The presence of this species



Map 2. North American Range of ELEOCHARSI ROSTELLATA.

in the Andes further accentuates western South America as the center of distribution of the series *Pauciflorae*.¹ The accompanying map (MAP. 2) gives, with the exception of the South American specimens, the known distribution of *E. rostellata*.²

In the illustrations of this group (PL. 320), I have selected material which shows the triangular and concave-sided character of the tubercle, which is probably the primitive condition. Immersion of these species (*E. rostellata*, *E. pauciflora*, and *E. parvula*) in an alkaline

¹ *E. simulans* C. B. Clarke (see RHODORA xxxi. 181 (1929)) is according to Clarke's manuscript at Kew "only an extreme state of *E. melanostachys* d'Urville" which is *E. macrorhiza* Boeckl., a species of the *Palustres* described from the Falkland Is. This classification agrees with the 2-parted style shown in the figure of *E. simulans* Clarke, Ill. Cyp. t. xxxvi (1909).

² Plants from the station in northern Michigan representing undistributed material from Wycamp Lake, Emmett County, H. A. Gleason, July 29, 1933, have culms up to 14.5 dm. long.

environment may possibly account for the indurated character of the tubercle which is so commonly seen.

Within the series *Pauciflorae* has appeared an additional, most unexpected species, which was published by Hultén as *Scirpus* (*Heleocharis*) *margaritaceus*. A specimen from the single known collection has been kindly given to me by Dr. Samuelsson. In order to conform with my treatment of *Eleocharis* I have written an emended description:

ELEOCHARIS margaritacea (Hultén), n. comb. PL. 320, FIG. 7. Subcespitose; culms glistening, 25–45 cm. high, sulcate, from a long gray caudex; apex of upper sheath blunt to slightly acute: spikelets about 1 cm. long, resembling those of *E. pauciflora*, the two lowest scales of the spikelet sterile, the lowest scale encircling the base of the spikelet, broadly ovate, deep brown below becoming yellowish-brown in older specimens, hyaline in the uppermost portion; the upper scales ovate, 1-nerved, obtuse or somewhat acute, costate, almost wholly scarious, with lacerate yellowish-brown margins in the older specimens: style 3-fid: stamens 3, with elongated flat whitened filaments: achene, including style-base, about 4 mm. long, glistening white with a cellular structure as in *E. pauciflora* but less prominent, the base much elongated, the apex surrounded by a turgid ring; style-base dark brown, conic-acute, approximately $\frac{1}{2}$ to $\frac{2}{3}$ mm. long, bristles brown, usually 6, retrorsely toothed, exceeding the achene.—*Scirpus* (*Eleocharis*) *margaritaceus* Hultén, Fl. Kamtchatka i. 167 fig. 12 (1927).¹ Known only from the type locality, between Petropavlovsk and Avatcha volcano, 250 m. alt. Hultén no. 1083. TYPE in Mus. Nat. Hist., Stockholm.

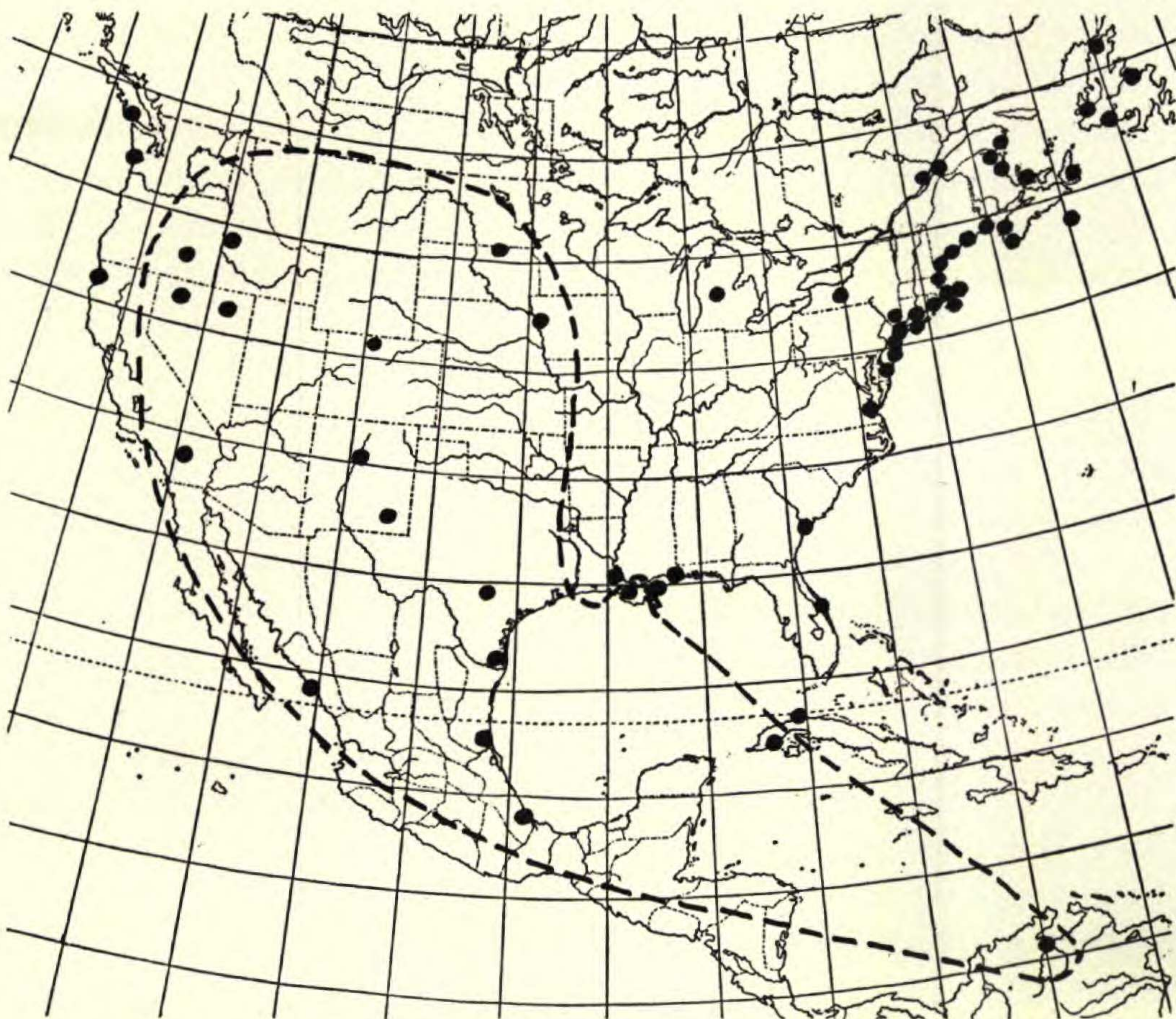
The shining white achenes, as Hultén notes, make the plant easily recognizable. Its relationship is unquestionably with *E. pauciflora* and the formation of a tumid ring at the base of the tubercle is curiously enough paralleled by a similar development in *E. albi-bracteata* and *E. boliviana* of the Andes. A character which is not shown by any other known species of *Eleocharis* is the long basal portion of the achene. This extended axis provides an unusual opportunity for examining the points of attachment of stamens and bristles. Careful dissection showed three stamens occupying the angles of the achene, inserted alternately with, and at the same level as three of the bristles. An additional set of three bristles occurred on a level of 0.4 mm. below, occupying positions corresponding to the achene angles, consequently directly opposite the stamens.

ELEOCHARIS PARVULA (R. & S.) Link var. **anachaeta** (Torr.)

¹ Kungl. Sv. Vet. Akad. Handlingar. ser. 3, Bd. 5, no. 1.

n. comb.—*E. pygmaea* Torr. var. β ? *anachaeta* Torr. Ann. Lyc. N. Y. iii. 441 (1836). *Chaetocyperus* (*Elaeocharis*) *membranaceus* Buckley, Proc. Acad. Sci. Philadelphia 1862 10 (1862). ?*Isolepis leptos* Steud. Cyp. 91 (1855). *Scirpus nanus* var. *anachaetus* Britton, Trans. N. Y. Acad. Sci. xi. 75 (1892). *Scirpus coloradoensis* Britton, Torreyia iv. 93 (1904). *Eleocharis leptos* Svenson, including vars. *coloradoensis* and *Johnstonii*, RHODORA xxxi. 176 (1929); not *E. leptos* C. B. Clarke in Dyer, Fl. Capensis vii. 758 (1900).

In my previous treatment I considered the slightly verrucose to papillose character of the achene surface, exhibited in its extreme form in the plants described by Britton as *Scirpus coloradoensis*, as



Map 3. North American Range of *ELEOCHARIS PARVULA*; var. *ANACHAETA* in ellipse.

a sufficient character in conjunction with reduction of bristles to separate the plant of southwestern United States from the common salt-marsh plant of the northern states. Examination of a larger amount of material than was available at that time has led me to

ally the plants more closely, and in treating the southern plant as a variety I am following the opinions of both Torrey and Kükenthal. Sharply angled achenes are not uncommon. The specimen of *Chaetocyperus membranaceus* at the Philadelphia Academy of Sciences is now without achenes, but because of the tubers and striated scales it appeared on examination to be *E. parvula*. Asa Gray¹ has cited the same collection as "*Eleocharis pygmaea*, Torr., the variety with naked achenia noticed in Nicollet's report." Careful measurements of achenes of the type collection of *Scirpus coloradoensis* show an average length (according to the method employed with *E. pauciflora*) of 1.1 mm., in this respect not substantially differing from *E. parvula*. The best-developed collection of *E. parvula* var. *anachaeta* that I have studied is Runyon no. 182, which has green culms 10–12 cm. long and green spikelets 6 mm. long, with as many as 23 flowers in a spikelet. The achenes average exactly 1 mm. To the localities cited previously may be added: SOUTH DAKOTA: borders of ponds near James River, Nicollet Exp. (N. Y.).² IOWA: moist clay flats along shore of Brown's Lake, T. 87 N., R. 47 W., Woodbury Co., Sept. 28, 1933, Hotchkiss no. 4578 (B). LOUISIANA: salt marshes, New Orleans, Hale no. 56 (N. Y.). TEXAS: *C. Wright* in 1845 (N. Y.); Brownsville, Runyon no. 182 (U. S.); San Antonio, Clemens in 1911 (Cal.). NEVADA: *A. G. Kennedy*, alkali ground, Elko, no. 4502. NEW MEXICO: in marsh near Loving, Standley no. 40354 (U. S.); "moist places near Albuquerque" (Torrey, Pacific R. R. Rept. iv. 152 (1857)), presumably the collection (N. Y.) from "near 35th parallel, Fort Smith to the Rio Grande, *J. M. Bigelow*." MEXICO: Vera Cruz, Morro de Boquilla, Liebmann (Kew, mixed with *E. retroflexa*). This collection is included under *Chaetocyperus polymorphus* β . *capillaceus* by Liebmann, Mex. Halvgraes 242 (1851). CUBA: Pinar del Rio, Ekman no. 16567 (det. Kükenthal), a collection which has practically smooth achenes.

The Californian plant (*E. leptos* var. *Johnstonii*) differs only in its larger achenes and recurved culms. Further collections will show whether these characteristics are constant. Steudel's improperly constructed specific name is untenable because of Clarke's *Eleocharis leptota* from South Africa. Dr. N. C. Fassett has sent me sterile material from Devil's Lake, Sauk Co., Wisconsin, which judging from the tuber-

¹ Proc. Acad. Sci. Philadelphia 1862 167 (1862).

² This locality was incorrectly reported in my previous paper. Following the route of the Nicollet Expedition (1839) as given by G. W. Warren in Pacific R. R. Rept. xi. 40–42 (1859) and outlined on a map accompanying the report, the station appears to be in what is now Faulk County.

bearing rootstocks is apparently *E. parvula*. This is true also of the sterile specimens with remarkably fleshy culms from Quebec and New Brunswick, which I believed to be *Sagittaria graminea*.¹ Typical *E. parvula*, in addition to its common occurrence on the seashore of eastern United States, is widespread in Europe on borders of the Baltic, North and Mediterranean Seas.

2. A NEW ELEOCHARIS FROM BRAZIL

ELEOCHARIS squamigera, n. sp. (PL. 320, FIG. 8) rhizomata elongata, cum squamis rubris instructa; culmis tenuibus sulcatis 5–20 cm. longis erectis vel recurvatis; vaginae apice acuto non mucronato; spicula ovata acutiuscula, 3–5 cm. longa, viridi vel castanea; gluma infima sterili, obtusa, hyalina; glumis ceteris acutiusculis carina viridibus cum lateribus roseis et margine hyalino; staminibus 2, antheris 0.8 mm. longis; stylo 3-fido; achaeniis quasi inter *E. acicularem* et *E. fistulosam*, trigonis vel plano-convexis, luteo-brunneis 1 mm. longis, longitudinaliter striatis et inter costas horizontaliter trabeculatis; stylobasi late conico-triangulato, acuto, brunnescenti; setis 6 luteo-brunneis tenuissimis, stylobasi aequilongis.—BRAZIL: Parana, Jaguarihyna in palud. *Dusén* 13276 (TYPE in Gray Herb.).

This specimen has the appearance of *E. tenuis* [*E. capitata* var. *typica*] and was so named by Pfeiffer. The systematic position is uncertain. In some respects the plant resembles the *Aciculares*, but the lowest scale of the spikelet is sterile. The surface markings have a similarity on a small scale to those of *E. fistulosa*.

EXPLANATION OF PLATE 320

(Habit-drawing $\frac{1}{2} \times$; achenes $20 \times$)

FIG. 1, ELEOCHARIS PAUCIFLORA, Scotland, *Fernald, Pease & Long* 2329; 2, *E. PAUCIFLORA* var. *FERNALDII*, Maine, *Fernald & Long* 12822; 3, *E. PAUCIFLORA* var. *BERNARDINA*, California, *Hall* 7605; 4, *E. PAUCIFLORA* (*E. atacamensis*), Chile, *Werdermann* 1297; 5, *E. PARVULA* var. *ANACHAETA*, Louisiana, *Drummond* 409; 6, *E. PARVULA*, New York, *Svenson* 4712; 7, *E. MARGARITACEA*, Kamtchatka, *Hultén* 1083; 8, *E. SQUAMIGERA*, Brazil, *Dusén* 13276; 9, *E. ROSTELLATA*, New York, *Svenson* 4887.

EXPLANATION OF PLATE 321

ELEOCHARIS PAUCIFLORA, habit, a little less than $\frac{1}{2} \times$, achenes $10 \times$. FIGS. 1 and 3, Scotland, *Fernald, Pease & Long* 2329; 2 and 5, Maine, *Fernald & Long* 12822 (var. *FERNALDII*); 4, Switzerland, *Fl. Rhaetica* 414; 6, Tibet, *Hooker*; 7 and 9, Chile, *Johnston* 4711; 8, California, *Hall* 7605 (var. *BERNARDINA*); 10, Chile, *Werdermann* 1297 (*E. atacamensis*); 11, Washington, *Suksdorf* 2237 (var. *SUKSDORFIANA*). Photo. by L. Buhle.

PLANTAGO ALTISSIMA IN MASSACHUSETTS.—Sometime ago I was checking various items in RHODORA against my own herbarium, and

¹ See RHODORA xxxi. 169 (1929).